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AUTHOR Donald, Janet Gail
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ABSTRACT

Initiating an individualized approach to instruction must begin with an assessment of the needs and goals of the teachers. To provide this analysis, a diagnostic system was built, consisting of an inventory of teaching and learning needs and of procedures for implementing a learning plan based on this inventory. A one hundred and four item inventory was constructed in six sections: professional development needs, attitudes toward education, background in instructional theory and design, an evaluation of a course taught, the use made of diverse methods of evaluating instruction, and an analysis of instructional problems. The inventory was presented to forty college professors who were told that its purpose was to examine their needs as teachers so that they would be able to determine their personal learning plans in their course. First analyses determined what each personal learning plan would be and acted as a contract between the teacher and the coordinator of the course. Inventory data was computerized as was data gathered from each participant throughout the course in regard to both the learning plan and the utility of the inventory. Results indicate that those teachers who are already motivated, self-directing, and have a specific problem which they wish to solve will put more effort into their work and will take better advantage of the resources provided. The need for further refinements of instruments and related questions for research are indicated. (DAG)

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WHEN PRETESTING BECOMES DIAGNOSIS:
MAKING INDIVIDUALIZED INSTRUCTION MORE PERSONAL

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by

Janet Gail Donald, Ph.D.
Centre for Learning and Development
McGill University

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Finding out what learners know before they begin a course of instruction is not a new concept in educational technology. The idea of pretesting has been preached if not practised since educators realized that to know how much learning has taken place, what students know in the beginning has to be subtracted from what they know at the end of the instruction. But procedures for pretesting received very little attention until individualized instruction caught fire and began to illuminate the need to respond to individual differences.

There are two beginning points to work from when one attempts to individualize instruction: it is possible to start with what is to be learned, or with the learner himself. In this study I attempted to analyze from both directions, but kept the idea of personalizing instruction foremost among my objectives.

For the past two years I have been involved in the development and evaluation of a first course in psychopedagogy, in an experimental program designed to provide resources and help to college teachers who wish to improve their instruction (Donald, 1974). In the process of planning and executing an individualized approach to instructional improvement it became evident that a first step would be the determination of the needs and goals of the participating teachers. To provide this analysis I have attempted to

build a diagnostic system which consists of: (1) an inventory of teaching and learning needs, and (2) a set of procedures for making use of the information gained from the inventory in the production of a learning plan for each participant. Because this project was an in-service project, that is, provided for teachers who are already teaching, the participating teachers had a varying number of years of teaching background. The teachers also came from a wide variety of subject areas, both academic and professional. A teacher's academic discipline can have an over-riding effect on his conception of what teaching is. For example, a science teacher tends to be highly concerned with methods of presenting information, whereas a dominant question for teachers in second language learning may be that of how to motivate students, and a teacher in a career program will be vitally interested in how well his students can apply what they have learned.

Guiding the development of the program was the demand made by the teachers that the program be made relevant to their own experience. Whatever program was designed, the approach had to be applied or concrete and it had to be assured that it would be significant in the milieu where the teacher was going to operate. Any educational theory or technique would therefore be judged on its relevance or adaptability to the teacher's milieu. Before a program could

be planned then, information had to be gathered about what was considered to be relevant by the teachers and what learning procedure could be developed for them. This led to the development of a thorough diagnostic and program planning procedure for the individual teacher to find out what was relevant to him.

Planning Models

The diagnostic procedure which I was looking for seemed to have something in common with a part of the CIPP model of evaluation developed by Daniel Stufflebeam in 1967. I was interested in the "C" part of the CIPP, that is, context evaluation rather than input or process or product evaluation. The purpose of context evaluation is to provide a rationale for the determination of the objectives of a system. I would be attempting to define the environment of a system of inservice training for college teachers and to identify needs, resources, and opportunities. The results would provide information for determining the priority of needs of teachers in this program.

I then began to search for models which would delineate more specifically what the context was and what the needs and goals of the teachers were. My search led me to the Harless book An Ounce of Analysis is Worth a Pound of Objectives (Harless, 1970). This book provides a system of

analyzing a situation in terms of the causes of a problem. If I considered the need to aid college teachers to improve their instruction could be a problem, then this model gave me a way of examining the causes of the problem. In the front-end analysis procedure Harless identifies three types of causes: first, lack of skills and knowledge, second, environmental causes; and third, motivation, incentive or attitudinal causes. Although as developer of an inservice training program I could only deal directly with the skills and knowledge and indirectly with motivation problems, using the front-end analysis procedure made me aware of the educational milieu in which I would be operating. For example, I was told to suspect a skill or knowledge problem where the population was new to the task: college level professors are very new to their task in Quebec. It was also evident that my population had little formal training in the area and that there had been no history of training capability in the organization of the colleges. I knew that there was a motivational problem because the experimental program which I was operating within had been designed as a certification program and the goal of improving instruction was only an underlying one.

One further level of analysis was needed to define the needs and goals of teachers in the program and Robert Mager's Goal Analysis (1972) provided the model. Several

kinds of front-end analysis including goal analysis, target population description, critical incident analysis, and performance analysis looked applicable. Because I would be reaching the college professors enrolled in this program through a "course," I needed some instruments that could be used within a group setting and within a limited time period. I knew that I would be unable to get a performance analysis on each of the teachers because I didn't have the means of going to the colleges and watching to see what they were doing. As an alternative, however, I prepared a course evaluation form for their use and asked them to provide me with an evaluation of a course which they were teaching to aid in the delineation of their program. I also asked them to auto-evaluate one of their courses, and included a set of questions about different teaching methods they had used and how they thought they had worked in their classes. This constituted one section of the Teaching Needs Inventory (See table I).

The skills and knowledge of my target population became another important area of investigation. It was included in the Teaching Needs Inventory under the heading of, "Your Background in Instructional Theory and Design." To analyze the goals of my teachers and their motivations and incentives, I developed with the help of several sources of goals inventories a trial goals analysis of professional

development needs for teachers. In addition to this goals analysis, I prepared a section on attitudes toward education on a progressive versus traditional continuum.

Finally, to round out this front-end analysis, I organized a critical incident analysis. Mager (1972) describes a critical incident analysis or a significant incident analysis as a description of indications that things are not going as desired, of what isn't happening right or what isn't happening right enough. I called this section, "Your Instructional or Classroom Problems." I now felt that I had analytical coverage for a context evaluation of the needs and goals of college teachers who wish to improve their instruction.

Teaching Needs Inventory

The result of my planning was a one hundred and four item Teaching Needs Inventory (See Table II). The inventory consisted of six sections. The first section, the professional development needs of teachers, included items on the teachers' need for general teaching improvement, the felt need for subject area improvement, teaching skills they wished to acquire, and a general innovative attitude.

The second section of the Teaching Needs Inventory looked at attitudes toward education. A general rating of

progressive attitudes was taken, a rating of preference for greater student participation, of progressive attitudes toward evaluation of their concept of where learning takes place and what a teacher's role should be, were examined in this section.

In the third section, background in instructional theory and design, competency in 21 teaching or learning theories and techniques was examined. The teachers were asked if they had studied and felt competent to teach others about the topics. Sample items included individualized instructio classroom interaction techniques, behaviour modification, learning theory and course design.

The fourth section of the inventory was an evaluation of a course which the teachers had taught or were currently teaching and covered items such as "I have been readily available for consultation with students;" "I have been raising challenging questions or problems for discussion;" "I have informed students how they will be evaluated in the course." I included in the inventory a fifth section which consisted of the use made of diverse methods of evaluating instruction. I did this because as an evaluator, I was interested in seeing how many different ways the teachers had considered and had used themselves. The evaluation methods suggested follow-ups of former students, and observation and evaluation of classes by invited colleagues, for example. These results

will be analyzed at a later date to find out how familiar teachers are with evaluation techniques, and which procedures they tend to use.

The final section of the teaching needs inventory was an analysis of instructional problems which began by asking the question, "Do you have any instructional or classroom problems?" Included in this analysis a problem was to be selected and described in as much detail as it could be and the general significance of the problem was to be stated. The goal which the teacher had when solving the problem and the price in time and energy that the teacher was willing to invest were also requested.

Method

The inventory was presented to the forty college professors enrolled in the program at their first regular meeting. The diagnostic procedure had previously been explained to them: they were told that the inventory had been prepared with the aim of examining their needs as teachers so that they would be able to determine their personal learning plans in the course. Because it was the first time this inventory was being used the teachers' queries about the inventory were recorded in order to refine the questions. At the end of the inventory was a page on which the teachers were asked to evaluate the importance and

relevance of the inventory and what changes or additions they would suggest. The inventories were first analyzed individually so that the information could be used immediately to determine what the individual teacher's personal learning plan for the program would be. This personal learning plan acted as a contract between the individual participating teacher and the coordinator of the course. The results of the inventory also afforded the opportunity to link people who seemed to have the same problems and to link people with the same goals in project groups.

The data from the inventory was then computer-recorded and a first descriptive analysis of the data was made. Information was added to the computer files on other topics such as the declared goals of the participants at registration. From the course evaluation given at the end of the semester, information about the participants' perception of the importance of the inventory, and the importance of the interview procedure and the personal learning plan was added to the computer file. In addition, several output variables were recorded. These included early completion of the personal learning contract, whether the participant's expectations were met in the course and a satisfaction index: whether the participants would take the course again. Although the teachers were evaluated on the basis of a pass for work completed or an "incomplete", a

measurement of the standard of work done by the teachers was given on a grading of A, B, or C. A measure of each participant's degree of self-direction defined by the participant's ability to explicate goals and to plan a concrete set of objectives was also recorded. The computer data was analyzed to determine the relationship between certain variables.

Results

Professional development needs. Teachers who consider their professional development needs to be important tended to show a greater tendency to early completion of their work in the course ($x^2 = 6.87$, $df = 2$; $p = .03$). A high relationship was also found between the need for teaching improvement and how important the teachers found the inventory itself ($x^2 = 10.29$, $df = 4$; $p = .04$). It is interesting to note that those teachers who had a high need for teaching improvement, that is, who wished to further develop as teachers were those who had the highest number of teaching competencies ($x^2 = 26.6$, $df = 16$; $p = .05$). In addition to this those teachers who registered themselves as understanding more of the basic knowledge and skills of teaching also felt a higher need to improve their teaching skills ($x^2 = 17.4$, $df = 16$; $p = .05$).

These results would lead us to infer that if teachers recognize a need for teaching improvement, particularly in

the area of teaching skills, then they will also find the diagnostic process important. They will also be more motivated to continue and will have a faster finishing rate. It also suggests something that educational consultants would tend to support, that those who know something about the process of teaching are more aware of the need for knowing more. This might also suggest that people in the teaching professions, no matter what their level, should be required to undergo a series of learning experiences in teaching skills techniques and theories so that they will be aware of the importance of their teaching abilities.

Attitudes toward education. The second measure taken in this study was of teachers' attitudes toward education, progressive or traditional. The results showed that there is a relationship between the progressive attitude of teachers and how important they found the diagnostic procedure ($x^2 = 13.3$, $df = 4$; $p = .01$). This is related to their recognition of the need for teaching improvement. Furthermore, if teachers agreed that there should be greater student participation in the academic operation of the college including curriculum development, evaluation, and grading policy, these teachers were also more likely to consider and declare that they had a teaching and learning problem that they wanted to work on. They tended to have a problem they wanted to solve, and at the same time were willing to expend effort in solving

it (x^2 = 10.4, df = 3; p = .02).

Teachers who found the inventory relevant to their needs were those teachers who had a progressive attitude toward breadth of curriculum in the college learning environment (x^2 = 6.4, df = 2; p = .04). From these results we can suppose that the methods of analysis and diagnosis in this course are favoured by teachers who tend to have more progressive attitudes. A problem-solving attitude and a willingness to expend the effort in grappling with the problem are related to a general progressive attitude of what the learning process should be.

Role of the teacher. Evidence to support the result above comes also from the teacher's attitude toward his role as a teacher. This measurement was defined by the attitudes that (1) it is more important for a teacher to spend time out of class interacting with students than interacting with colleagues, (2) that students should play an active role in the classroom and (3) that it is equally important for teachers to spend time experimenting with different teaching methods as it is to increase their knowledge in their subject area. This attitude was related to the teacher's willingness and ability to declare a classroom problem and likewise the willingness to expend effort to solve the problem (x^2 = 6.1, df = 2; p = .05).

The teacher who saw his role in a more progressive manner was also the teacher who had greater declared teaching competencies ($x^2 = 28.8$, df = 16; p = .03). This would lead us to suppose that how the teacher defines his role has an important effect on his willingness to attempt to improve his teaching and to develop competencies or to consider himself as a competent teacher. We can also suppose that teachers who have been more attuned to teaching improvement also have a progressive attitude toward their role as teachers.

Diagnostic procedure. Several relationships among the diagnostic procedure and the goal of course improvement were found. Those teachers who declared problems that they wanted to solve were willing to expend the effort to solve them ($x^2 = 33.8$, df = 1; $p > .001$). Those who defined problems and were willing to expend effort to solve them also considered that the inventory procedure was very important itself ($x^2 = 6.4$, df = 2; p = .04). This could lead us to suppose that the importance of the diagnostic procedure is due to whether the teacher considers he has a problem in his teaching or not. Conversely, the process is important if the teacher is already aware of teaching problems or has a problem-solving orientation to teaching.

Self-direction. The teacher who was considered to

be self-directed in his work, that is, the teacher who outlined his problems, was able to outline goals and was able to set up a personal learning plan with little difficulty, in short, who already knew what he wanted from the course and from the program, tended to do better in the course as measured by the "grade" gained (x^2 = 19.3, df = 6; p = .01). The self-directed teacher also had his expectations for the course met (x^2 = 6.9, df = 2; p = .04).

One general conclusion that can be reached from these results is that to do well and to do a good job in course improvement you have to first be motivated and you have to have course improvement as a goal. One could go further to suppose that course improvement is not a serendipitous activity and that the motivation for course improvement must be present. Overall it becomes apparent that those teachers who are already motivated, who are self-directing, and have a specific problem which they wish to solve will put more effort into their work and will take better advantage of the resources provided.

The Next Step

Thus far the research has shown us that the diagnostic procedure can tell us a great deal about the target population. It also tells us that those who have goals, whether they are labelled as problems, or the general goal of course

improvement, or a progressive attitude toward learning are going to benefit from a diagnostic procedure. Those who are already more competent in their teaching skills are also going to benefit from such a diagnostic procedure. It remains then to look at what effects such procedures have in creating an atmosphere of self-direction and of problem-solving. Those teachers who attached importance to the inventory and to the procedures of goals analysis and learning planning were those who were already aware. A further evaluation of what effect this procedure had on the development of the individual professor's program will be examined at a later date. Course evaluation data has revealed that overall the professors valued quite highly the inventory and the diagnostic procedure as a whole. They also valued the interview with the coordinator which included the design of the personal learning plan. The diagnostic procedure had the following effect: (1) It allowed a prospective participant to examine the possible learning tasks he might take, (2) it enabled a participant to establish contact with an advisor or consultant in the program and (3) it provided continuing guidance to the participant. There are quite a few questions remaining however. These include, "How important are these diagnostic instruments and procedures in the clarification of professors' needs in terms of later outcomes?"

The analysis of this data has shown that a survey of professional development needs and a survey of attitudes toward learning can provide important information about the willingness of a teacher to proceed and to benefit from such a program. Further work needs to be done on the areas of evaluation of courses and different evaluation methods used, particularly evaluations of performance in the classroom, in the college. We have also seen the importance of motivation and animation of the teacher. We must now ask ourselves, "How can we continue this motivation?", "How can we raise the level of motivation?" and "How can we creative a motivation in a teacher who does not feel it himself?" What kind of experiences can we give the teacher to get him going? It can further be supposed that contrary to supposition, most teachers, although they do have a feeling about how they're teaching do not have a professional overview of what they're doing. They do not have a large vocabulary of educational terms. The course evaluation showed that 63% of the participants in the program felt that they had enlarged their vocabulary of educational terms from their reading during the course, but another 25% felt that they had not. Sixty-nine per cent of the teachers would have liked to have been supplied with a glossary of educational terms. At the same time, just under 40% of the teachers, when they came into the course, did not want to spend more

than one session on educational theory. I should note that by the end of the course they were ready to go into greater depth and a far larger percentage were agreeable to continuing the pursuit of an understanding of educational theories and techniques.

It remains for the next study to describe how useful and pertinent the diagnostic procedures were in establishing what the participants would go on to accomplish at a later date in the program. It can be seen that within the boundary of one semester of the program the diagnostic procedure provided information about who would succeed and who would get most out of such a program. A study of how many teachers followed through in the program to achieve what the diagnosis showed their goals to be will be attempted. Another recommended study is that of the effect of certain personal variables such as amount of formal education, subject matter area, and sex on goals, attitudes and outcomes.

There is a need for instrument refinement. A study of the effect of the individual items on the diagnostic inventory would hopefully provide some ideas of how to eliminate some items. Suggestions from the participating teachers and refinement of vocabulary are necessary. Only the first small step has been taken in a project with possible long term effects for teacher education. The next big step is to delineate the major objectives in the program

and the first objectives to be attempted. This will be done with the help of results from a total program evaluation which has just begun.

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TABLE 1

Application of Goals Analysis to the Teaching Needs Inventory

Performance analysis: (1) course evaluation by students in a class
(2) auto-evaluation

Target population description: Background in instructional theory and design

Goals analysis: (1) professional development needs
(2) attitudes toward education

Critical incident analysis: instructional problems

TABLE II

Teaching Needs Inventory

I Professional Development needs of teachers

1. General teaching improvement *
2. Subject area improvement
3. Teaching skills *
4. Innovative attitude

II Attitudes toward education

1. Progressive attitudes *
2. Greater student participation *
3. Progressive evaluation
4. Importance of classroom
5. Breadth of curriculum *
6. Teacher role *

III Background in instructional theory and design *

- competency in 21 teaching or learning theories and techniques

IV Evaluation of a course which the teacher had taught

V The use made of diverse methods of evaluating instruction

VI An analysis of instructional problems *

* Showed significant relationships with other measures